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New species of Uredineae—IV

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The following new species are from various parts of the United States, Canada, Mexico and West Indies. They were found in part among new collections sent for determination and in part among herbarium material which has long been known under other names. For the new material I am especially indebted to Messrs. E. W. D. Holway, C. L. Shear, G. P. Clinton, LeRoy Abrams and C. H. Demetrio. In the present descriptions I have used instead of the terms spermogonium, aecidium, uredo and teleutosorus, the new terms pycnium (*πυκνός*), aecium (*αἰχία*), uredinium (uredo) and telium (*τέλος*), which were recently proposed by the writer* as more convenient and uniform. Their application is sufficiently self-evident to make further explanation unnecessary.

Uromyces Dolicholi sp. nov.

II. Uredinia amphigenous, scattered, round, 0.2–0.5 mm. across, soon naked, pale cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores globose, 18–21 μ in diameter, wall cinnamon-brown, medium thick, 1.5–2 μ , minutely and closely echinulate, pores 4, equatorial.

III. Telia amphigenous, scattered, round, 0.2–0.5 mm. across, soon naked, cinnamon-brown, pulverulent, ruptured epidermis inconspicuous; teliospores oblong, or oblong-lanceolate, 10–15 by 26–32 μ , narrowed toward both ends, wall pale golden-brown, smooth, thin, 1 μ or less, thicker at apex, 3–6 μ , with nearly colorless umbo; pedicels slender, half length of spore, nearly colorless.

On *Dolicholus texanus* (T. & G.) Vail (*Rynchosia texana* T. & G.), San Angelo, Texas, October 19, 1904, C. L. Shear (host determined by E. L. Greene).

A strongly marked species. To the unaided eye there is little difference between the uredinia and telia, both being produced in abundance, but under the microscope the teliospores appear much

* ARTHUR, J. C. Terminology of the spore-structures in the Uredinales. Bot. Gaz. 39: 219–222. 1905.

paler than the urediniospores, and both are unlike the usual leguminous species of *Uromyces*.

***Puccinia Dolichi* sp. nov.**

II. Uredinia hypophyllous, irregularly scattered, round, small, 0.25 mm. across, soon naked, chestnut-brown, pulverulent, ruptured epidermis inconspicuous; urediniospores globose, small, 19–23 μ in diameter; wall chestnut-brown, rather thin, 1.5–2 μ , minutely echinulate, pores 3, or rarely 4, equatorial.

III. Telia not seen; teliospores in the uredinia, oblong, very large, 30–40 by 50–70 μ , acute or acuminate at the apex, rounded or obtuse at base, slightly or not constricted at septum; wall semi-opaque, chocolate-brown, thick, 3 μ , thickened and prolonged into a prominent, lighter-colored rostrum at apex, 10–15 μ , surface coarsely verrucose, with very low tubercles, smoother or smooth on the rostrum; pedicel colored next the spore, 6–12 μ thick, once length of spore.

On *Dolichos reticulatus* Hochst., Aguacate (province of Habana), Cuba, March 23, 1903, *E. W. D. Holway*.

***Puccinia Fimbristylidis* sp. nov.**

II. Uredinia chiefly hypophyllous and cauliculous, oblong, 0.5–1 mm. long, soon naked, yellow, pulverulent, ruptured epidermis noticeable; urediniospores broadly elliptical or globoid, 15–20 by 18–23 μ , wall brownish-yellow, medium thick, 1.5 μ , sparsely and evenly echinulate with low points, pores 2, equatorial and opposite.

III. Telia chiefly hypophyllous and cauliculous, subepidermal, covered with the brown epidermis, irregularly oblong, 0.1–0.5 mm. long, or punctiform, compound, each component sorus round, surrounded by abundant, dark-brown, hyphal stroma; teliospores oblong, 16–19 by 34–50 μ , slightly constricted at septum, acute or obtuse at apex, somewhat narrowed at base, wall smooth, golden-brown, medium thick, 1–1.5 μ , thicker at apex, 4–9 μ ; pedicel very short, colored.

On *Fimbristylis polymorpha* Boeckl. (type), Cuernavaca, State of Morelos, Mexico, Sept. 27, 1898, *E. W. D. Holway* 3227; *F. Holwayana* Fernald, Chapala, State of Jalisco, Mexico, Sept. 9, 1899, *Holway* 3443; *Fimbristylis* sp., Mayaguez, Porto Rico, April 13, 1904, *G. P. Clinton* 48; the last with uredinia only.

This species differs materially from *Puccinia Eleocharidis* Arth. in the telial characters, although the urediniospores have a close

resemblance. In *P. Eleocharidis* the stroma is absent, and the telia are simple, while the teliospores are more rounded above. The urediniospores of both species differ conspicuously from those of *Uredo superior* Arth. in size. All three species occur in Porto Rico.

***Puccinia Pattersoniana* sp. nov.**

II. Uredinia epiphyllous, oblong, soon naked; urediniospores ellipsoid, 21–26 by 28–34 μ , wall golden-yellow, thick, 3 μ , sparingly and prominently verrucose, pores 3 (?), approximately equatorial.

III. Telia epiphyllous, intercostal, oblong-linear, soon naked, ruptured epidermis noticeable; teliospores oblong, somewhat angular, 16–22 by 30–37 μ , slightly or not constricted at septum, rounded or obtuse at both ends; wall golden-brown, uniformly thin throughout, 1 μ , appearing smooth when wet, finely and closely striate when dry; pedicel delicate, 5–7 μ thick, once to twice length of spore, nearly colorless.

On the rough, or concave side of leaves of *Agropyron spicatum* (Pursh) Rydb., Sandcoulee, Cascade Co., Montana, July, 1888, F. W. Anderson.

The urediniospores of this species somewhat resemble those of *Puccinia Agropyri*, but the teliospores are very unlike any known North American rusts on grasses, especially in the uniformly thin walls and surface striation. The specific name is given in recognition of the services rendered to mycology by Mrs. Flora W. Patterson, curator of the cryptogamic herbarium of the United States Department of Agriculture.

***Cronartium Comptoniae* sp. nov.**

II. Uredinia hypophyllous, scattered or somewhat gregarious, round, very small, about 0.1 mm. across, dehiscent by a central rupture, soon wide open and naked, pulverulent; peridia rather firm, cells polygonal, at the sides with walls uniformly thin, about 1 μ , at the top with the inner walls greatly thickened, up to 10 μ ; urediniospores oval or obovate, 16–21 by 23–31 μ , wall colorless, rather thick, 2.5 μ , sparsely and finely echinulate.

III. Telia hypophyllous, filiform, 40–100 μ thick, 0.5–2 mm. long; teliospores fusiform-oblong, 13–17 by 28–56 μ , obtuse at both ends; walls nearly colorless, smooth, thin, 1–1.5 μ .

On *Comptonia peregrina* (L.) Coult. (*C. asplenifolia* Gaertn.), Egg Harbor, N. J., Sept. 7, 1874, J. C. Arthur (type); Belle Plain, N. J., Oct. 15, 1902, C. L. Shear (in Ellis & Everhart,

Fungi Columbiani, no. 1724); Newton, Mass., without date, *W. G. Farlow* (in Ellis, North American Fungi, no. 285); *Myrica Gale* L., Orono, Me., Oct. 12, 1900, *P. L. Ricker* (in Ellis & Everhart, Fungi Columbiani, no. 1482).

The much thickened inner walls of the uredinial peridium and the thin-walled teliospores especially distinguish this species. It has been reported on the first named species from North Carolina, New York, and Vermont, in addition to the above data.

***Hyalopsora pellaeicola* sp. nov.**

II. Uredinia amphigenous, scattered, irregularly round or oblong, bullate, 0.3–0.7 mm across, dehiscent by apical rupture, soon naked, pulverulent, golden-yellow, ruptured epidermis noticeable, peridia very delicate and difficult to detect; urediniospores globoid or obovate-globoid, 17–22 by 23–30 μ , wall colorless, thin, 1 μ , usually appearing twice as thick, minutely verrucose, or even echinulate-verrucose, pores obscure, equatorial.

III. Telia unknown.

On *Pellaea andromedaefolia* (Kaulf.) Fée, San Gabriel Cañon, Los Angeles County, California, March 13, 1903, *LeRoy Abrams* 3125 (type); *Cryptogramme Stelleri* (Gmel.) Prantl, (*Pellaea gracilis* Hook.), Red Rock, Michigan, June 28, 1884, *J. Macoun* (host determined by L. M. Underwood), and Decorah, Iowa, August 1882, *E. W. D. Holway*.

The large globoid and very thin-walled urediniospores sharply distinguish this species from those on *Phegopteris* and *Cystopteris*.

CERATELIUM gen. nov.

Pycnia and aecia unknown. Uredinia with peridium, centrally dehiscent, urediniospores borne singly on pedicels, wall nearly colorless, echinulate, pores obscure, contents colored. Telia with spores united into a short column, or globoid mass, arising at first from bed of the uredinia, waxy; teliospores one-celled, wall smooth, nearly or quite colorless.

***Ceratidium Canavaliae* sp. nov.**

II. Uredinia hypophyllous, gregarious on reddish-brown spots, crowded, small, 0.1–0.2 mm. across, bullate, ruptured epidermis inconspicuous, centrally dehiscent; peridia delicate, cells polygonal, inner walls slightly if any thicker than the outer walls; urediniospores broadly ellipsoid or globoid, 18–23 by 26–34 μ ;

wall medium thick, $1-2\mu$, pale-yellowish, sparsely and minutely echinulate, pores obscure.

III. Telia hypophyllous, columns scarcely extending beyond the peridia, about as long as broad; teliospores cylindrical or polygonal, small, 6-9 by $13-17\mu$, wall smooth, thin, $0.5-0.8\mu$, colorless.

On *Canavalia ensiformis* DC., Mayaguez, Porto Rico, April 16, 1904, *G. P. Clinton* 87.

An especially interesting rust on account of the combination of a melampsoraceous fungus with a leguminous host. The collection shows an abundance of telia. They are less conspicuous than the uredinia, and need to be studied by means of sections. The possession of a peridium in the uredinia at once widely separates the species from any of the usual leguminous rusts. The telia resemble those of *Dietelia*, only are much smaller. The species possesses a uredinial stage, however, which is absent in *Dietelia*. Except in the length of the telial column, there is considerable resemblance to *Cronartium*.

Coleosporium Eupatorii sp. nov.

II. Uredinia chiefly hypophyllous, scattered, round, small, 0.25 mm. across, early naked, pulverulent, yellow fading to white, ruptured epidermis somewhat noticeable; urediniospores short ellipsoid, or globoid, 15-20 by $22-27\mu$; wall colorless, medium thick, $2-2.5\mu$, half formed by the rather large, irregular, deciduous tubercles.

III. Telia unknown.

On *Eupatorium macrophyllum* L., El Yunque, Baracoa, Cuba, March 12, 1903, *E. W. D. Holway* (type); *Eupatorium* sp., Volcan Mombacho, Department of Granada, Nicaragua, February 20, 1903, *C. F. Baker* 2461, communicated by *E. W. D. Holway*.

The species is distinguished from *Coleosporium Steviae* Arth. by larger uredinia and smaller urediniospores. The walls of the spores are thicker, and the tubercles larger and noticeably irregular in form, not round and papilliform as in *C. Steviae* and many other species.

Uredo Dichromenae sp. nov.

II. Uredinia hypophyllous, scattered, oblong, 0.2-0.5 mm. long, covered by the overarching epidermis, and having an apparent peridium of hyphae; urediniospores elliptical, or broadly obovate,

18–23 by 22–35 μ , wall light yellow, medium thick, 1.5–2 μ , sharply and sparsely echinulate, pores obscure.

On *Dichromena ciliata* Vahl, Mayaguez, Porto Rico, April 13, 1904, *G. P. Clinton* (type); *D. radicans* Cham. & Schl., near Troy, Jamaica, May, 1903, *L. M. Underwood* (hosts determined by N. L. Britton).

Both collections are much parasitized, making it difficult to see the structure of the sorus. All sections show what seems like a peridium, enclosing the sorus after the manner of that in *Uredinopsis*. If it is a true hyphal structure, however, the exact construction cannot be made out.

Aecidium Falcatae sp. nov.

O. Pycnia amphigenous, in small groups, punctiform, honey-yellow, wholly immersed, subepidermal, in vertical section globose, 100–125 μ in diameter.

I. Aecia hypophyllous, gregarious in rather large, circular or irregular groups, crowded; peridia short, cylindrical, margin somewhat recurved, finely lacerate; aeciospores globoid, 18–23 by 19–25 μ ; wall rather thin, 2 μ , rather coarsely verrucose.

On *Falcata comosa* (L.) Kuntze (*Amphicarpa monoica* Ell.), Decorah, Iowa, June 21, 1881, *E. W. D. Holway* (type); *Apios Apios* (L.) MacM. (*A. tuberosa* Moench), Ames, Iowa, June 17, 1879, *W. A. Thomas*, and Iowa City, Iowa, June, 1886, *Thomas H. Macbride*.

This aecial stage differs slightly from that on various species of *Phaseolus*, *Strophostyles*, and *Vigna*, in having more prominent aecia, with more globoid and rougher aeciospores, and is therefore described as a separate species from *Uromyces appendiculatus* Ung., to which it has usually been referred. As it is not known to be followed by any other stage on the same hosts, it is assumed to be a heteroecious species. Besides occurring in Iowa it is reported from Illinois, Minnesota, Wisconsin, and Nebraska.

Aecidium Triostei sp. nov.

O. Pycnia epiphyllous, in small groups, punctiform, honey-yellow, subepidermal, seen in vertical section globose, 90–130 μ in diameter.

I. Aecia hypophyllous, in circular groups, 5 mm. or more across, not crowded; peridium at first hemispherical, low, margin

erect, erose ; aeciospores globoid, $18-22\ \mu$ in diameter ; wall thin, $1\ \mu$ thick, pale-yellow, minutely and closely verrucose.

On *Triosteum angustifolium* L., Perryville, Missouri, May, 1884, C. H. Demetrio.

No aecial or other form of rust is recorded on this host, or any closely related one. It is probably a heteroecismal species.

Aecidium Cardui sp. nov.

O. Pycnia epiphyllous, in small groups, immersed, inconspicuous, punctiform, subepidermal, globose, $130-180\ \mu$ in diameter.

I. Aecia hypophyllous, crowded in circinating groups, 3-5 mm. across, on discolored spots ; peridia short, cylindrical, margin erect, erose ; aeciospores globoid, small, $15-18$ by $16-20\ \mu$; wall nearly colorless, very thin, $0.5-1\ \mu$, very minutely granulose.

On *Carduus Hookerianus* (Nutt.) Heller (*Cirsium Hookerianum* Nutt.), Sandcoulee, Montana, July 28, 1887, F. W. Anderson 82.

The common rust on various thistles, which extends across the continent and is especially common westward, is *Puccinia Cirsii* Lasch., and is a species having uredinia and telia, but no aecia. *P. suaveolens* (Pers.) Rostr. is a similar species found only on *Carduus arvensis*, while *P. Cnici* Mart., occurring on *Carduus lanceolatus*, has aecia of a wholly different and peculiar sort. There appears, therefore, to be no recognized species of rust on thistle to which this *Aecidium* can be referred, and it is consequently described as an independent form. Whether it belongs with an autoecious or heteroecious species can not be stated. The collector only included leaves of the host, and did not supply a specific name. The material has been submitted to Dr. P. A. Rydberg, of the New York Botanical Garden, who gives the above name, but with some degree of uncertainty, due to the very scanty material.

Aecidium Argithamniae sp. nov.

O. Pycnia epiphyllous, few in orbicular groups, not crowded, punctiform, honey-yellow becoming dark-brown, conspicuous, immersed, in section globoid, large, $150-175\ \mu$ across.

I. Aecia hypophyllous, on discolored spots in orbicular or annular groups, 2-5 mm. across, not crowded, cylindrical, short, margin erect, erose or lacerate ; aeciospores globoid, $15-18$ by

18–21 μ ; wall nearly colorless, very thin, 1 μ or less, very minutely verrucose, appearing smooth.

On *Argithamnia Schiediana* Müll. Arg. (?), Trinidad, State of Hidalgo, Mexico, May 25, 1904, *C. G. Pringle*, communicated by E. W. D. Holway.

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